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Relationship between patients' pre-operative anxiety level and administration of anxiolytic premedication

Abstract

Objective: To evaluate the relationship between the patient's reported level of pre-operative anxiety, the anaesthesiologist's assessment of the patient's anxiety level and the administration of anxiolytic premedication prior to entering the operating room.

Methods: Patient pre-operative anxiety levels were assessed using a simple visual analogue scale (0 = no anxiety to 10 = severe anxiety) in the pre-operative holding area. The anaesthesiologist independently visually assessed the patient's level of anxiety on a similar zero to ten anxiety rating scale at the time of their pre-operative interview. Immediately after completing their pre-operative evaluation, the anaesthesiologist decided whether to order the administration of an anxiolytic medication prior to the patient entering the operating room.

Results: Based on the anxiety score reported by 293 patients on the numeric analogue scale, 171 patients (58%) reported no-to-low levels of anxiety (scores ≤3) and 122 (42%) reported moderate-to-high levels of anxiety (scores ≥4). Based on the observational assessment by the anaesthesiologists, 205 (70%) of the patients were assigned an anxiety score of 3 or less and 88 (30%) were assigned an anxiety score of 4 or more. Overall, 188 out of the 293 patients (64%) received parenteral anxiolytic premedication. However, only 61 of 122 (50%) patients reporting moderate-to-high levels of anxiety received an anxiolytic medication prior to entering the operating room. Surprisingly, 127 of 171 (74%) patients reporting little or no anxiety were administered an anxiolytic drug. Interestingly, there was no significant difference in the average anxiety scores of patients who received anxiolytic premedication and those who did not.

Conclusions: These data suggest that anaesthesia providers' observation of the patient did not accurately assess the patient's level of acute anxiety and the need for anxiolytic premedication. This results in both undertreatment of anxious patients and overtreatment of patients with low levels of anxiety. Perioperative nurses are uniquely positioned to improve the appropriate use and administration of anxiolytic drugs in the pre-operative holding area by incorporating a pre-operative assessment of the patient's acute anxiety as part of their routine perioperative nursing assessment. This nurse-centric approach could also facilitate the communication of objective data regarding the patient's reported anxiety level to the anaesthesia team, enabling them to improve their decision-making process regarding the use of premedication in the pre-operative period.

Keywords: assessing acute pre-operative anxiety, use of anxiolytic premedication, role of perioperative nursing

Introduction

The immediate pre-operative period is associated with high levels of state anxiety in patients undergoing elective surgery, with the incidence reported between 40 and 95 per cent[1–4]. In a recent study by Goyal et al.[5], the patients' levels of anxiety were assessed on the day prior to their operation, during the pre-operative period on the day of surgery and post-operatively on the day after surgery, using the 'gold standard' State–Trait Anxiety Inventory (STAI) scale. These investigators found that anxiety scores were highest on the day of surgery[5].

Moderate-to-high levels of pre-operative anxiety correlate directly with negative post-operative outcomes, including increased anaesthetic and analgesic requirements, higher incidences of nausea and vomiting, bronchospasm in asthmatic patients, intensified post-operative pain, delayed post-surgical wound healing, longer recovery and discharge times, and even elevated post-operative mortality rates after cardiac surgery[6–8]. A recent meta-analysis on the impact of pre-operative anxiety on surgical outcomes by Shebl et al.[9] found a significant association between pre-operative anxiety and increased anaesthetic and analgesic requirements, post-operative delirium, prolonged recovery times and post-operative pain.

Despite these well-documented adverse consequences of excessive pre-operative anxiety, assessment of the patient's pre-operative anxiety level is not part of the routine practice for either anaesthesia providers or perioperative nurses in the pre-operative holding area.

Studies have consistently demonstrated a poor correlation between the anaesthesia provider's perceived level of patient anxiety and the actual measured level of patient anxiety[10,11]. Shafer et al.[11] confirmed that the visual prediction of a patient's pre-operative anxiety level is highly variable. In our recent editorial[12], we argued that including a simple anxiety assessment tool as part of the routine pre-operative evaluation of patients prior to entering the operating room could improve the anaesthesiologist's decision-making process regarding the use of anxiolytic premedication. A data-driven approach to administering premedication would also enhance patient satisfaction and reduce perioperative complications. Administering a simple numeric anxiety analogue scale requires less than 15 seconds[13–15] and is a task which could also be part of the routine perioperative nursing assessment.

Aim

The primary aim of the current study was to evaluate the relationship between the patient's reported level of acute pre-operative anxiety, the anaesthesiologists' visual assessment of the patient's anxiety level and the anaesthesiologists' decision regarding administration of anxiolytic premedication in the pre-operative holding area. The secondary aim was to assess the relationship between the patient's demographic characteristics and their level of acute (state) anxiety in the immediate pre-operative period.

Methods

The Institutional Review Board (IRB) at Cedars-Sinai Medical Center in Los Angeles, California, approved this observational, prospective cohort study (IRB # Pro00043383).

Of the 302 patients who met the study entrance criteria, 293 patients provided written informed consent to participate in the study and successfully completed the study requirements. The inclusion criteria of the study population were being classified as levels I to III on the American Society of Anesthesiologists (ASA) physical status classification system, aged between 18 and 80 years old and scheduled to undergo elective surgery. Exclusion criteria included Alzheimer's disease, dementia, psychiatric diseases or intellectual disabilities, as well as patients taking chronic anti-anxiety, antidepressant, opioid analgesic or sedative-hypnotic medications.

We assessed the patient's pre-operative anxiety level on the day of surgery using a simpler and less time-consuming visual analogue scale (VAS) than the STAI scale; the VAS we used had been previously validated against the STAI scale with patients undergoing elective surgery[15]. This simple 0–10 visual analogue scale (0 = no anxiety, 10= extremely anxious) was found to possess similar accuracy to the STAI while requiring significantly less time to perform in the busy pre-operative holding area. The scale the anaesthesiologists used to visually assess patient anxiety was a 0–10 analogue scale with the same anchors (0 = no anxiety, 10= extremely anxious).

At Cedars-Sinai Medical Center in Los Angeles, there are no guidelines regarding the use of anxiolytic premedication drugs. The anaesthesiology team does not routinely inquire as to the patient's level of acute (state) anxiety prior to entering the operating room (OR). Similarly, the perioperative nurses in the pre-operative holding area do not routinely inquire as to the patient's level of anxiety prior to entering the OR.

After patients who had consented to participate in the study were admitted to the pre-operative evaluation area, the attending anaesthesiologist conducted their routine pre-operative evaluation and was asked to include a visual (non-verbal) assessment of the patient's acute anxiety level. The score was verbally given to the research assistant by the anaesthesiologist after the anaesthesiologist left the patient's bedside. Immediately following this, the research assistant went to the patient

and asked the patient to assess their level of acute anxiety using the VAS. The research assistant also inquired about the patient's demographic characteristics and any major concerns regarding the impending operation. After completing the pre-operative evaluation, the anaesthesiologist determined whether to administer anxiolytic premedication (midazolam 2 mg IV or propofol 20 mg IV) based on their visual assessment of the patient in the pre-operative holding area.

After completing the VAS anxiety evaluation, patients were asked to identify the specific causes of any pre-operative anxiety from a list provided by the research assistant. This list included 11 items – fear of death; waiting to enter the operating theatre; insufficient information regarding surgery or anaesthesia; fear of the surgical procedure or anaesthesia (for example, being conscious during the operation); fear of needles and other interventions; post-operative pain, excessive drowsiness or post-operative nausea and vomiting; the need for a blood transfusion; potential physical or psychological harm; lack of medical insurance coverage; concerns about family and friends, and potential financial loss resulting from absence from work.

Patient demographic data was collected from the medical records and the medical history provided by the patients after completing the bedside anxiety assessment, and included age, gender, ethnicity, psychiatric history, co-morbidities and history of smoking. Additional demographic information included marital status, education level, current living situation, health insurance coverage, chronic anxiety and use of pain medication, as well as previous surgical procedures and any anaesthesia-related complications and the pre-operative level of pain using a ten-point visual analogue pain scale (0 = no pain, 10 = extreme pain).

All study evaluations were completed in the pre-operative evaluation area prior to the patient entering the OR. No sedative-anxiolytic medication was administered to the participants before the completion of the anaesthesiologist's anxiety evaluation and the patient's self-evaluation. All pre-operative medication ordered by the anaesthesiologist was recorded, in addition to intra-operative and post-operative anaesthetic and analgesic drug usage, anaesthesia time, surgery time, and length of stay in the Post Anaesthesia Care Unit (PACU). Upon entering the PACU and upon discharge from the PACU, the patient's pain level was reassessed using the same ten-point visual analogue pain scale as was used previously.

Statistical analysis

A comparative analysis of the patients' self-assessed anxiety scores and the anaesthesiologists' visually assessed anxiety scores was performed. A biostatistician performed a power analysis to determine the size of the study population based on a previous study[15]. Spearman's rank correlation analysis using ranked data was performed to examine the relationship between the patients' self-assessed anxiety score and the anaesthesiologists' visual anxiety assessment. The coefficient alphas (Cα1) for both anxiety scores were determined to be 0.80. Based on this calculation, it was determined that a sample size of 293 participants would be needed for the two independent anxiety assessments.

Our data analysis was performed using SAS 9.4 for Windows (SAS Institute, Cary, NC, USA) and R.3.0.1. This dataset contained both categorical and continuous measurements. For categorical measures, we presented total numbers (n) with percentages (%) and used the Chi-squared test to conduct comparisons between the two independent anxiety assessments. For continuous and ordinal measures, the Kruskal-Wallis test was performed. Data are presented as mean values ± standard deviation, numbers and percentages. P-values < 0.05 were considered statistically significant.

Results

VAS scores and demographic and clinical variables

Table 1 summarises the demographic characteristics of the 293 study participants. Of these, 155 (53%) were female, 137 (47%) were aged over 60 and 167 (57%) were married. In terms of medication taken the night before surgery, 51 (17%) participants took an oral antianxiety medication for sleep on the night before surgery and 96 (33%) took an oral non-opioid analgesic medication on the night prior to surgery.

Demographic variables associated with significantly different mean pre-operative VAS scores were being female, being aged less than 40 years old and being married. Patients who did not take antianxiety medication on the night prior to surgery had higher anxiety scores than those who did. Patients with a history of previous surgical procedures had higher anxiety scores than those undergoing their first operation, and those with a history of previous anaesthetic complications were more anxious than patients without prior anaesthetic or surgical complications. Finally, patients who had undergone 3–5 previous surgical procedures reported higher anxiety scores than those with no previous surgery, 1–2 procedures, or more than 5 procedures.

There was no statistically significant correlation between participant VAS scores and any of the clinical variables. However, there was a positive correlation between the patient's pre-operative anxiety score and the pain score at the time of discharge from the PACU ($p = 0.03$).

Patient VAS scores and anaesthesiologist assessment of patient anxiety

Table 2 summarises the patients' VAS scores, the anaesthesiologists' visual assessments of patient anxiety and the number of patients who received medication before entering the OR. There was a statistically significant difference ($p < 0.05$) between the patients' self-evaluation of their pre-operative (state) anxiety level and the anaesthesiologist assessment of their anxiety level, with patients reporting a significantly higher mean anxiety level. Based on a score of 4 or more, 122 (42%) patients reported that they were experiencing moderate-to-high levels of anxiety at the time of their pre-operative evaluation while 88 patients were assessed with this level of anxiety by an anaesthesiologist.

Anxiety scores and administration of premedication

Figure 1 shows the anxiety levels of patients (self-reported and anaesthesiologist determined) and numbers of patients who received anxiolytic premedication. Only 61 (50%) of the 122 patients with self-reported anxiety scores of 4 or more received anxiolytic

Table 1: Correlation of demographic characteristics of participants (N = 293) with anxiety scores

Variables		Frequency (%)	VAS score ≤ 3 (n = 171)	VAS score ≥ 4 (n = 122)	p-value
Gender	female	155 (53)	75	80	0.0002
	male	138 (47)	96	42	
Age	< 40 years	62 (21)	35	27	0.0001
	40–60 years	94 (32)	53	41	
	> 60 years	137 (47)	83	54	
ASA classification	Level I	44 (15)	27	16	0.089
	Level II	147 (50)	76	70	
	Level III	102 (35)	68	36	
Marital status	married	167 (57)	79	46	0.032
	unmarried	126 (43)	92	76	
Living arrangement	alone	231 (79)	132	100	0.321
	with others	62 (21)	39	22	
Years of education	10–15	47 (16)	30	17	0.470
	> 15	246 (84)	141	105	
Smoking status	current or former smoker	14 (5)	161	119	0.165
	non-smoker	279 (95)	10	3	
Antianxiety medication	did take it the night before surgery	50 (17)	25	26	0.136
	did not take it the night before surgery	243 (83)	146	196	0.018
Pain medication	did take it the night before surgery	96 (33)	53	43	0.445
	did not take it the night before surgery	197 (77)	118	79	TBC
Type of surgery	general	135 (46)	8	6	0.506
	orthopaedic	79 (27)	6	2	
	neuro-spine	47 (16)	33	15	
	cardiothoracic	14 (5)	75	61	
	vascular	9 (3)	46	34	
	obstetric/gynaecological	9 (3)	3	4	
Type of anaesthesia	general	223 (76)	132	90	0.500
	MAC sedation	70 (24)	39	32	
Prior surgery	no	261 (89)	156	106	0.234
	yes, with complications	26 (9)	14	12	0.625
Prior anaesthesia	yes	270 (92)	158	112	0.852
	yes, with complications	21 (7)	8	13	0.035

MAC = monitored anaesthesia care

Table 2: Patient VAS scores, anaesthesiologist scores and premedication numbers (N = 293)

Anxiety score	Patients reporting this score (n)	Patients given this score by anaesthesiologist (n)	Patients receiving premedication (n)
0	43	14	8
1	29	43	33
2	54	83	50
3	45	65	36
anxiety score ≤3 (n)	171	205	127
4	21	46	32
5	38	19	14
6	23	8	4
7	24	6	6
8	6	4	1
9	7	4	3
10	3	1	1
anxiety score ≥ 4 (n)	122	88	61
Mean ± SD	3.39 ± 2.50	2.9±1.81*	p= 0.0074*

n = number of patients, SD = standard deviation

premedication. Of the 88 patients (30%) assessed by the anaesthesiologist as having an anxiety score of 4 or more, 61 (69%) were prescribed anxiolytic premedication. Surprisingly, 127 (74%) of the 171 patients who reported no or low anxiety (VAS score ≤ 3) and 127 (62%) of the 205 patients assessed with no or low anxiety by anaesthesia providers received anxiolytic premedication. In total, 188 patients (64%) received anxiolytic premedication – 181 received midazolam (1–2 mg IV) and seven received propofol (20 mg IV).

The average patient VAS score for patients prescribed anxiolytic premedication by their anaesthesiologist was 3.6±2.6 and the average score for patients who did not receive anxiolytic premedication was 3.0±2.2. The difference between these was not statistically significant (p = 0.11).

Causes of pre-operative anxiety

Table 3 summarises patient-identified causes of pre-operative anxiety. The most frequently reported causes were waiting in the pre-operative area (n = 165, 56%), anticipation of post-operative pain (n = 125, 43%), concern about family (n = 119, 41%), lack of information about the operation (n = 117, 40%) and lack of information regarding anaesthesia (n = 92, 31%).

Discussion

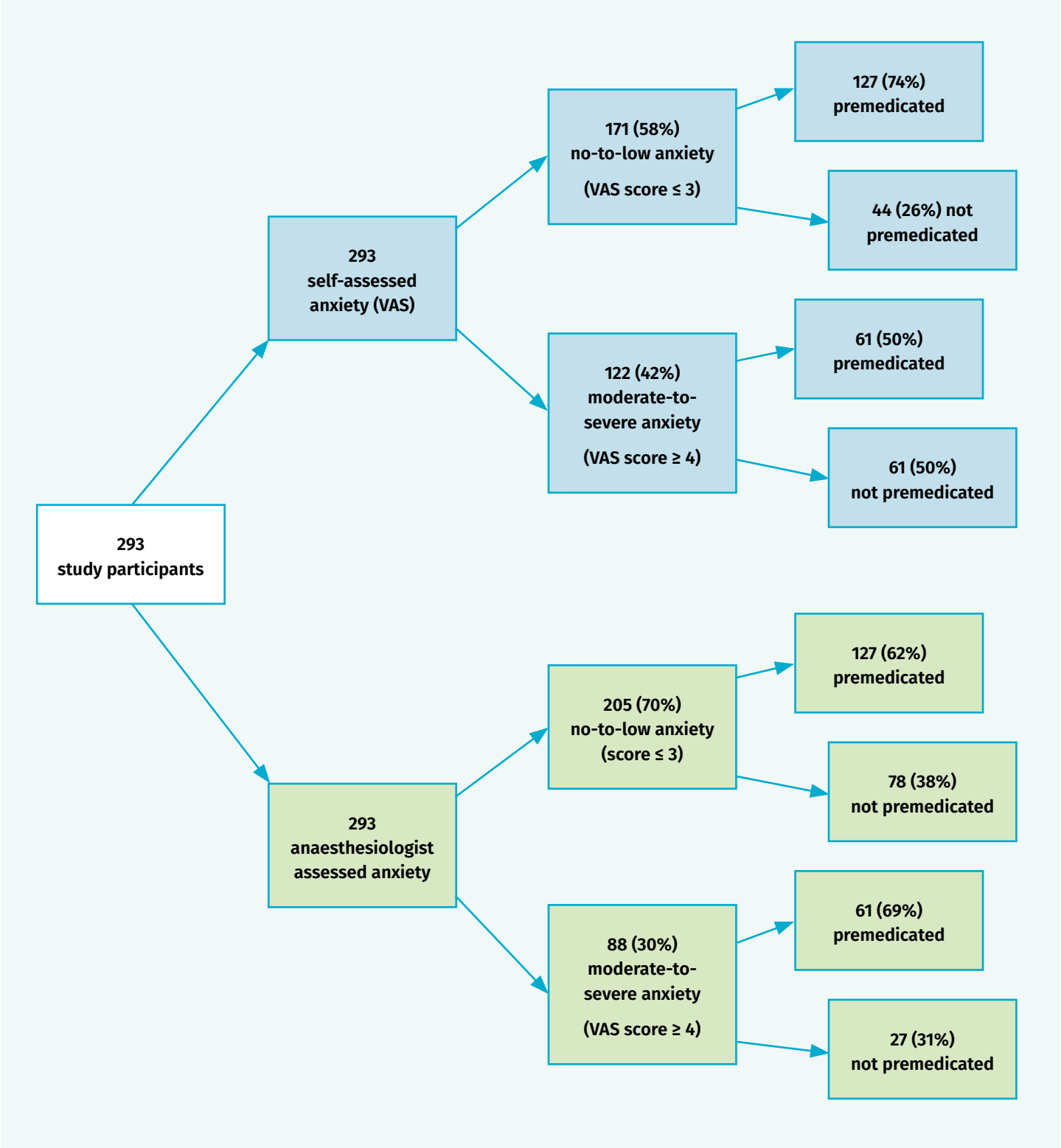
Despite the proven effectiveness of benzodiazepines in reducing pre-operative anxiety and enhancing patient satisfaction with their surgical experience[16], this study confirmed earlier studies indicating a random pattern of anxiolytic premedication administration by anaesthesia providers, with patients reporting high levels of pre-operative anxiety often failing to receive an anxiolytic premedication, while many patients with minimal anxiety were given anxiolytic premedication[17,18]. This common practice can result in risks from both undertreatment (anxiety-related complications) and overtreatment (delirium, falls and delayed discharge, particularly in the elderly population)[19–22,23].

Fekrat et al.[22] reported that both anaesthesiologists and surgeons were unable to accurately predict the patients' desire for relief of their pre-operative anxiety. Consistent with this, and with the results of other studies[9,10,24], we also found a 'poor correlation' between the patient's objectively measured acute anxiety level and the anaesthesia providers' visually assessed level of the patient's anxiety. Consistent with our current findings, other published studies have documented an unacceptably high incidence of moderate-to-severe anxiety in elective surgery patients prior to entering the OR[1–4].

Our results also demonstrated that the anaesthesiologist's visual assessment of the patients' anxiety level in the pre-operative holding area significantly underestimated the patients' reported level of anxiety. The inability to predict anxiolytic needs with accuracy translates directly into clinical practice, with only half of the patients with moderate-to-high anxiety (VAS score ≥ 4) receiving premedication, while more than half the patients reporting low levels of anxiety (VAS score ≤ 3) were premedicated. A similar pre-operative anxiety study found that only four per cent of 115 patients undergoing elective surgical procedures received anxiolytic premedication, despite 66 per cent of the patients reporting significant anxiety during their pre-operative evaluation[25]. This assessment gap is a core driver of the need to streamline the pre-operative assessment of anxiety and to improve the current haphazard administration of premedication prior to the patient entering the OR. The published literature clearly supports the fact that high levels of pre-operative anxiety are associated with adverse clinical outcomes in the perioperative period[26–27]. In addition, the ineffective treatment of pre-operative anxiety may be associated with increased post-operative pain[28–31].

The findings from the current study also confirm findings from earlier studies – higher perioperative anxiety is correlated with female patients[32–34], younger patients (< 40 years old)[25], the use of general anaesthesia (vs. regional/local)[13,36] and a history of previous surgery[37]. However, estimated surgical duration was not a significant predictor[2,34,38].

Figure 1: Flow chart of patient assessment and medication



Our findings also identify a direct link between pre-operative anxiety scores and maximum pain scores in the PACU. Therefore, more precise knowledge of a patient's pre-operative anxiety level if communicated by the perioperative nurse to the anaesthesia care team could not only improve patient comfort prior to entering the OR but also enhance the anaesthesiologist's ability to be proactive in addressing the patient's post-operative analgesic needs. In addition, selectively administering anxiolytic premedication only to patients who are likely to benefit from it, and avoiding its use in those with

Table 3: Distribution of causes of pre-operative anxiety

Cause of pre-operative anxiety	Frequency (%)
waiting in the pre-operative area	165 (56%)
anticipation of post-operative pain	125 (43%)
concern about family	119 (41%)
lack of information about the operation	117 (40%)
lack of information about anaesthesia	92 (31%)
fear of needles or catheters	87 (30%)
fear of the operation itself	81 (28%)
fear of not awakening from anaesthesia	77 (26%)
loss of control during the perioperative period	72 (25%)
awareness during anaesthesia	69 (24%)
post-operative nausea and vomiting	64 (22%)
fear of anaesthesia	58 (20%)
potential physical or mental harm from surgery	53 (18%)
financial loss after surgery	49 (17%)
inadequate insurance coverage	49 (17%)
being completely dependent on medical staff	47 (16%)
need for blood transfusion	46 (16%)
other	30 (11%)

minimal or no anxiety, may reduce the incidence of side effects such as residual sedation that can delay emergence from anaesthesia. This will support a smoother recovery process[32].

The role of perioperative nursing

The practical question which arises from this study is: Why do anaesthesia providers and pre-operative nurses fail to incorporate a simple anxiety assessment scale into their routine clinical practices? Some explanations include perceived time constraints, lack of knowledge regarding simple validated anxiety assessment tools, failure to appreciate the potential deleterious effects of excessive (state) anxiety and the need to address seemingly more pressing issues in the pre-operative evaluation period prior to the patient entering the OR. We would argue that perioperative nursing should play a more active role in obtaining an accurate, patient-centred anxiety assessment and provide this information to the anaesthesia care team in a timely fashion.

Suggestions for improving the management of acute pre-operative anxiety

- Standardised, objective assessments of acute state anxiety in the pre-operative holding area using a simple VAS or categorical scale. This would require less than 15 seconds to perform[15] and could be incorporated into perioperative nurses' standard evaluation, analogous to how pain assessment in the perioperative period has become standard practice (i.e. fifth vital sign).
- Management of causes of anxiety by perioperative nurses. Non-pharmacological techniques, such as relaxation techniques, imagery and hypnosis, could be used to mitigate causes of pre-operative anxiety.

Our study identified several patient concerns that are common causes of pre-operative anxiety (see Table 3) including waiting in the pre-operative area, anticipation of post-operative pain and lack of information about the surgical procedure and anaesthesia.

Perioperative nurses are well positioned to address these patient concerns – for example, actively listening to patients' concerns during the waiting time and applying simple non-pharmacological relaxation techniques, such as music and yoga breathing, could alleviate anxiety due to waiting, and implementing targeted educational programmes that provide accurate and timely information about the procedure could reduce anxiety due to lack of information.

Finally, by identifying patients with high anxiety scores (VAS score ≥ 4), perioperative nurses can alert the anaesthesia care team to administer anxiolytic premedication prior to the patient entering the operating theatre.

Future clinical studies should examine the impact of administering anxiolytic medications to patients with high pre-operative anxiety levels on post-operative outcomes, including patient satisfaction with their overall perioperative experience. Importantly, an assessment of pre-operative anxiety should be incorporated into the perioperative nursing evaluation, analogous to the current pre- and post-operative pain assessments[12].

We hope our findings will encourage anaesthesiologists and perioperative nurses to begin routinely evaluating acute anxiety in the pre-operative holding area and optimise the administration of anxiolytic premedication to patients prior to entering the OR.

Conclusion

The routine assessment of acute pre-operative anxiety with an easy-to-use anxiety scale should be incorporated into the standard perioperative nursing evaluation, analogous to the assessment of acute pain. A data-driven approach, which enables more precise administration of anxiolytic premedication, can ensure that highly anxious patients receive treatment while minimising the risks of over-treatment of non-anxious patients with these drugs. Perioperative nursing can play a pivotal role in optimising the treatment

of anxiety in the pre-operative holding area. Future studies should examine the impact of a nurse-led assessment of pre-operative anxiety in conjunction with the implementation of a 'targeted' approach to optimising the management of pre-operative anxiety and improving patient outcomes.

Conflict of interest and funding statement

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